



Guide for



## Wind Energy Engineers in California

**May also be called:** Alternative Energy Engineers; Renewable Energy Engineers; Rotor Aerodynamics Engineers; Structural Analysis Engineers; Systems Engineers; and Wind Resources Engineers

### What Would I Do?

Sailboats, irrigation pumps, and isolated homes and farms have long used the wind as a power source. The late 1800s saw the earliest versions of the modern wind turbines. Current wind farms consist of multiple wind turbines and are located throughout the world as clean energy sources. Wind Energy Engineers are one of the many types of alternative energy engineers developing clean energy from alternative resources with competitive prices to today's carbon-based sources of energy. Wind Energy Engineers work on various projects that produce energy from the wind such as utility-scale wind farms, community wind systems, and distributed wind and offshore wind projects.

Wind Energy Engineers design and develop new practical technologies and prepare site specifications for renewable energy purposes through wind farm collection systems. They specialize in resource assessment, wind turbine design, feasibility studies, new technology evaluations, project proposal evaluations, conceptual designs, and performance and cost estimates.

Wind Energy Engineers test new ideas and create new technologies for production. They usually work as part of a team of engineers to define experiments, perform analyses, construct models, and demonstrate systems which will further renewable energy technologies.

### Tools and Technology

Wind Energy Engineers work with specialized software systems including computer-aided design (CAD), map creation, spreadsheet, and word processing. Other tools used include anemometers, barometers, global positioning system (GPS) receivers, radarbased surveillance systems, soil core sampling apparatuses, temperature transmitters, and wind surface observing apparatuses.

### Important Tasks and Related Skills

Each task is matched to a sample skill required to carry out the task.

Task	Skill Used in this Task
Design underground or overhead wind farm collector systems.	Technology Design
Analyze operation of wind farms or wind farm components to determine reliability, performance, and compliance with specifications.	Quality Control Analysis

Create models to optimize the layout of wind farm access roads, crane pads, crane paths, collection systems, substations, switchyards, or transmission lines.	Design
Create or maintain wind farm layouts, schematics, or other visual documentation for wind farms.	Visualization
Develop active control algorithms, electronics, software, electromechanical, or electrohydraulic systems for wind turbines.	Programming
Develop specifications for wind technology components, such as gearboxes, blades, generators, frequency converters, and pad transformers.	Mechanical
Direct balance of plant (BOP) construction, generator installation, testing, commissioning, or supervisory control and data acquisition (SCADA) to ensure compliance with specifications.	Building and Construction
Monitor wind farm construction to ensure compliance with regulatory standards or environmental requirements.	Problem Sensitivity
Perform root cause analysis on wind turbine tower component failures.	Critical Thinking
Provide engineering technical support to designers of prototype wind turbines.	Troubleshooting
Test wind turbine components, using mechanical or electronic testing equipment.	Computers and Electronics
Test wind turbine equipment to determine effects of stress or fatigue.	Operations Monitoring
Investigate experimental wind turbines or wind turbine technologies for properties such as aerodynamics, production, noise, and load.	Physics
Oversee the work activities of wind farm consultants or subcontractors.	Coordination
Recommend process or infrastructure changes to improve wind turbine performance, reduce operational costs, or comply with regulations.	Systems Evaluation
Write reports to document wind farm collector system test results.	Clerical

Source: U.S. Department of Labor [Occupational Information Network \(O\\*NET\)](https://online.onetcenter.org) at [online.onetcenter.org](https://online.onetcenter.org)

## Working Conditions

Wind Energy Engineers split their time between the office environment and on location for specific wind projects. When on site, Engineers will often need to climb to heights greater than 100 feet and will experience both hot and cold environments. To ensure the safety of the Engineers and others, the Engineers will be subject to random drug tests and will be required to use safety equipment. Most Engineers work a standard 40-hour week, but can expect occasional evening, weekend, and holiday work to meet pressing needs. Wind Energy Engineers may also travel extensively due to a shortage of experienced Engineers.

Wind Energy Engineers may become members of such unions as the Professional Engineers in California Government (PECG).

### ***Will This Job Fit Me?***

The job of Wind Energy Engineer may appeal to those who enjoy working with ideas that require an extensive amount of thinking. They search for facts using a variety of sources in order to solve complex engineering problems while working independently or as part of a team.

### ***What Wages and Benefits Can I Expect?***

#### **Wages**

A formal salary survey is not available; however, references to annual salaries range from \$60,000 to \$130,000. All salaries depend on the pay structure established by each employer for work performed, the nature of the project, and the level of skill required.

#### **Benefits**

Benefits that Wind Energy Engineers typically receive include medical, dental, and life insurance, sick leave, vacation, holidays, retirement and 401(k) plans, and tuition reimbursement.

### ***What is the Job Outlook?***

As this is an emerging occupation, the number of Wind Energy Engineers in California is unknown at this time. Employment opportunities should increase in the future considering society's growing interest in environmental protection and the development of alternative energy sources.

### ***How Do I Qualify?***

#### **Education, Training, and Other Requirements**

Most Wind Energy Engineers come from a range of academic backgrounds. The minimum education requirement is a bachelor's degree in engineering or a related field of study. Most Wind Energy Engineers have a degree in one of the following areas: aeronautical, aerospace, civil, electrical, or mechanical engineering, as well as aerodynamics, atmospheric science, computer science, mathematics, or physics. Some Engineers continue their education by obtaining a master's or doctoral degree, and may substitute this education for required experience.

#### **Experience**

Employers generally require applicants to possess 2 to 10 years of work experience in order to consider them for the position. This is due to the varying nature and complexity of projects throughout the field.

#### **Early Career Planning**

High school students planning to become a Wind Energy Engineer should take classes in English, chemistry, mathematics, biological and life sciences, computer science or CAD programs, and mechanical drawing.

#### **Continuing Education**

While continuing education is not necessarily a requirement, most Wind Energy Engineers need to update their knowledge through workshops, seminars, and ongoing training. They also need to keep up with changes to environmental codes and regulations.

#### **Licensing**

Although a Professional Engineer's (PE) license is not required for most Wind Energy Engineers, a licensed Engineer will have a competitive edge for advancement to more responsible positions.

To obtain a PE license, Engineers must first pass the Engineer-in-Training or Fundamentals of Engineering examination which requires at least three years of coursework from a college or

university offering an engineering program accredited by the Accreditation Board for Engineering and Technology (ABET), or three years of engineering-related experience. The next step in the process is to pass the professional examination which requires a bachelor's degree in engineering from an ABET-accredited institution, along with two years of engineering experience. Engineers without a bachelor's degree in engineering must possess six years of experience. Engineers must renew the license every two years. Contact the agency that issues the license for additional information.

### Where Can I Find Training?

There are two ways to search for training information at [www.labormarketinfo.edd.ca.gov/?Pageid=1013](http://www.labormarketinfo.edd.ca.gov/?Pageid=1013):

- [Search by Field of Study](#) to find what programs are available and what schools offer those programs. You may use keywords such as: ABET, Energy, and Engineer.
- [Search by Training Provider](#) to find schools by name, type of school, or location.

Contact the schools you are interested in to learn about the classes available, tuition and fees, and any prerequisite course work.

### Where Would I Work?

According to the 2009 *California Green Economy Survey*, Wind Energy Engineers were surveyed under the broader field of Alternative Energy Engineers. Results indicate that they largely work in research and development and engineering and consulting services firms as well as in the following industries: Specialty Trade Contractors, Educational Services, and Utilities.

### Finding a Job

Direct application to employers remains one of the most effective job search methods. Wind Energy Engineers can also register with their school placement center for job leads. Professional associations and organizations provide job leads as well. **Online job opening systems** include JobCentral at [www.jobcentral.com](http://www.jobcentral.com) and CalJOBS<sup>SM</sup> at [www.caljobs.ca.gov](http://www.caljobs.ca.gov).

To find your nearest One-Stop Career Center, go to [Service Locator](http://www.servicelocator.org) at [www.servicelocator.org](http://www.servicelocator.org). View the [helpful job search tips](http://www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf) at [www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf](http://www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf) for more resources (requires [Adobe Reader](#)).

### Yellow Page Headings

You can focus your local job search by checking employers listed online or in your local telephone directory. Below are some suggested headings where you might find employers of Wind Energy Engineers.

- Alternative Power
- Environmental Compliance
- Green Energy
- Wind Energy

### Find Possible Employers

To locate a list of employers in your area, use "Find Employers" on the LaborMarketInfo website at [www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empMain.aspx?menuChoice=emp](http://www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empMain.aspx?menuChoice=emp)

- Select the search for employers by occupation.
- Select a geographic area.
- Search for an occupation by keyword, occupation, or category.
- Select one of the top industries that employ the occupation.
- This will give you a list of employers in that industry in your area.
- Click on "View Filter Selections" to limit your list to specific cities or employer size.
- Click on an employer for the street address, telephone number, size of business, website, etc.
- Contact the employer for possible employment.

### ***Where Could This Job Lead?***

After years of experience working for private firms or government agencies, Wind Energy Engineers sometimes join consulting firms or start their own businesses. Engineers may also take on additional responsibilities and work on more complex projects as means for advancement.

### ***Related Occupations***

Below is a list of occupations related to Wind Energy Engineers.

- Aerospace Engineers (SOC 17-2011)
- Biomass Engineers
- Chemical Engineers (SOC 17-2041)
- Civil Engineers (SOC 17-2051)
- Electrical Engineers (SOC 17-2071)
- Geothermal Engineers
- Mechanical Engineers (SOC 17-2141)
- Solar Energy Systems Engineers (SOC 17-2199)

### ***Other Sources***

- California Board for Professional Engineers, Land Surveyors, and Geologists  
[www.pels.ca.gov](http://www.pels.ca.gov)
- California Department of Consumer Affairs  
[www.dca.ca.gov](http://www.dca.ca.gov)
- California Energy Commission  
[www.energy.ca.gov](http://www.energy.ca.gov)
- California Environmental Protection Agency  
[www.calepa.ca.gov](http://www.calepa.ca.gov)
- California Society of Professional Engineers  
[www.cspe.com](http://www.cspe.com)
- U.S. Department of Energy, Energy Efficiency & Renewable Energy  
[www.eere.energy.gov](http://www.eere.energy.gov)
- Accreditation Board for Engineering and Technology  
[www.abet.org](http://www.abet.org)
- American Society for Engineering Education  
[www.asee.org](http://www.asee.org)
- Institute of Electrical and Electronics Engineers  
[www.ieee.org](http://www.ieee.org)
- Junior Engineering Technical Society  
[www.jets.org](http://www.jets.org)
- National Society of Professional Engineers  
[www.nspe.org](http://www.nspe.org)
- Professional Engineers in California Government  
[www.pecg.org](http://www.pecg.org)

These links are provided for your convenience and do not constitute an endorsement by EDD.

### ***For the Career Professional***

The following codes are provided to assist counselors, job placement workers, or other career professionals.

<b>System</b>	<b>Code</b>
SOC – <a href="http://www.bls.gov/soc">Standard Occupational Classification</a> at <a href="http://www.bls.gov/soc">www.bls.gov/soc</a>	N/A
O*NET – <a href="http://online.onetcenter.org">Occupational Information Network</a> at <a href="http://online.onetcenter.org">online.onetcenter.org</a>	17-2199.10

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The California Occupational Guides are a product of:  
The California Employment Development Department  
Labor Market Information Division  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)

Published: 2/6/2012

*This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use by an organization and/or personal use by an individual for non-commercial purposes is permissible. All other uses require the prior authorization of the copyright owner.*

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